Office of Chief Counsel
Internal Revenue Service

memorandum

CC:NER:MIC:DET:TL-N-8301-98
GEGabriel

date:

to: Larry I. Walter
Inventory Issue Specialist

from: Grant E. Gabriel
Counsel to Inventory Issue Specialist

subject: [redacted]
LIFO Index Computation

This memorandum responds to your request for assistance regarding the above-referenced taxpayer's method of sampling and method of determining its price index, under its application of the dollar-value, last-in, first-out (LIFO) inventory method, pursuant to Treas. Reg. §§ 1.472-8(e)(1) and (2), respectively.

ISSUES:

(1) Under the circumstances described below, whether [redacted]'s [redacted] sampling method is in accordance with the requirements set forth in Treas. Reg. § 1.472-8(e)(1).

(2) Under the circumstances described below, whether [redacted]'s method of determining its LIFO price index (other than its sampling method in "Issue (1)") is in accordance with the requirements set forth in Treas. Reg. § 1.472-8(e)(2)(iv).

CONCLUSIONS:

Issue (1): No. [redacted]'s sampling technique is not in accordance with the requirements of Treas. Reg. § 1.472-8(e)(1) because each item does not have a non-zero chance of selection. Therefore, [redacted]'s sampling method does not clearly reflect income.

Issue (2): No. [redacted]'s method of determining its LIFO price index is not in accordance with the requirements set forth in Treas. Reg. § 1.472-8(e)(2)(iv) because [redacted]'s LIFO index is not based on the ratio of total current-year cost **for the pool** to total base-year cost **for the pool**. Therefore [redacted]'s LIFO index computation method does not clearly reflect income.

FACTS:

[redacted], a calendar year taxpayer, elected the dollar-value LIFO method for its taxable year beginning [redacted]. [redacted] elected to determine current-year cost of items making up a pool by reference to the actual cost of the goods purchased or produced during the taxable year in the order of acquisition ("earliest acquisitions cost method") in accordance with Treas. Reg. § 1.472-8(e)(2)(ii)(a) based on a link-chain price index.

[redacted] uses a method of sampling to obtain its indexes for inflation termed "probability proportional to size." Under this method, [redacted] draws sample units from each LIFO inventory pool population, based on probabilities proportional to the size of the recorded amount of the items in the population. In addition, under this method [redacted] lays out its inventory in specific sequence so that every dollar of first-in, first-out (FIFO) inventory has an equal chance of selection and every dollar of FIFO inventory (as it relates to the various items in the inventory) has a specific place in the layout of the inventory. This results in each dollar in the population becoming a sampling unit. The total population of sampling units equals the population dollars. However, if a "dollar" is sampled representing a new item (physical good), the dollar is put back into the population and a new "dollar" is sampled.

After an item is selected, both the end of the year and beginning of the year unit costs are determined. [redacted] computes a ratio by dividing the end of the year unit cost by the beginning of the year unit cost. Any sampling unit for which no beginning of the year unit cost can be determined is removed from the sample. These items are labeled NPYI (not in prior-year inventory). Once ratios have been determined for each sample unit, the ratios are summed. The sum of the ratios is divided by the total number of sample units, less the number of NPYI sample units, giving the pool weighted index. The total current-year cost of all items in the pool, including all NPYI items, is then divided by the pool index to determine the base cost for the pool[1].

LAW:

Section 472(a) of the Code allows a taxpayer to elect the LIFO inventory method. The use of the LIFO method, however, must be in accordance with the regulations, must be applied on a consistent basis, and must clearly reflect income. In addition, inventories on LIFO must not be valued lower than cost.

Treas. Reg. § 1.472-8(e)(1) provides that a taxpayer may ordinarily use only the so-called "double-extension" method for computing the base-year and current-year cost of a dollar-value inventory pool. Where the use of the double-extension method is impractical, because of technological changes, the extensive variety of items, or extreme fluctuations in the variety of the items in a dollar-value pool, the taxpayer may

[1]Attachment A sets forth an example of [redacted]s sample valuation technique.

use an index method for computing all or part of the LIFO value of the pool. An index method may be computed by double-extending a representative portion of the inventory in a pool or by the use of other sound and consistent statistical methods. The index used must be appropriate to the inventory pool to which it is to be applied. The appropriateness of the method of computing the index and the accuracy, reliability, and suitability of the use of such index must be demonstrated to the satisfaction of the district director in connection with the examination of the taxpayer's income tax returns. The use of any so-called link-chain method will be approved only in those cases where the taxpayer can demonstrate to the satisfaction of the district director that the use of either an index method or the double-extension method would be impractical or unsuitable in view of the nature of the pool.

Treas. Reg. § 1.472-8(e)(2)(iii) provides that under the double-extension method a base-year unit cost must be ascertained for each item entering a pool for the first time subsequent to the beginning of the base year. In such a case, the base-year unit cost of the entering item shall be the current-year cost of that item unless the taxpayer uses an index method by double extending a representative portion of the inventory in the pool or by the use of other sound and consistent statistical methods.' The use of the word "other" in the regulations indicates that the "representative portion" must also be selected using sound and consistent statistical methods. Sound and consistent statistical methods require that every item in the population must have a non-zero chance of selection. If some portion of the population has no chance of selection, the sampling technique does not have sufficient reliability and, therefore, is not a representative sample, Such a sample is not representative of entire population.[2]

Treas. Reg. § 1.472-8(e)(2)(iv) provides that to determine whether there is an increment or liquidation in a pool for a particular taxable year, the end of the year inventory of the pool expressed in terms of the base-year cost is compared with the beginning of the year inventory of the pool expressed in terms of base-year cost. When the end of the year inventory of the pool exceeds the beginning of the year inventory of the pool, an increment occurs in the pool for that year. If there is an increment for the taxable year, the ratio of the total current-year cost of the pool to the total base-year cost of the pool must be computed. This ratio when multiplied by the amount of the increment measured in terms of base-year cost gives the LIFO value of the increment.

ANALYSIS AND CONCLUSIONS::

Issue (1): *Whether [redacted]'s sampling method satisfies the requirements set forth in Treas. Reg. § 1.472-8(e)(1).*

---

[2]This issue has been specifically identified in All Industries Coordinated Issue Paper entitled "Segment of Inventory Excluded from the Computation of the LIFO Index, effective date October 23, 1995 (Attachment B) .

Section 1.472-8(e)(2)(iii) provides that the base-year unit cost of a new item is its current-year cost unless the taxpayer uses an index method by double extending a representative portion of the inventory in the pool *or* by using "other sound and consistent statistical methods." The use of the word "**other**" in the regulations indicates that the **"representative portion" must also be selected using sound and consistent statistical methods**. Sound and consistent statistical methods require that every item in the population must have a **non-zero** chance of selection. If some portion of the population has no chance of selection, the sampling technique will not have sufficient reliability to represent the entire population with a sufficient degree of confidence.[3]

In this case, [redacted]'s probability in proportion to size sampling method, although not objectionable in terms of stratifying a sample (placing greater importance on higher value items), does not functionally result in all items in the sample having a non-zero chance of selection. This is because a dollar that is sampled is assigned as a new "item[4]" and put back into the population universe. This effectively gives new items a zero chance of selection because every dollar representing a new item has a zero chance of impacting the price-index computation. In essence, the price index relating to existing items is assigned to new items in [redacted]'s inventory. Thus, [redacted] must re-evaluate its samples and include all NPYI items, assigning each a ratio of one. Alternatively, [redacted] may reconstruct a beginning of the year cost for any NPYI items and use the resulting index. Thus, [redacted]'s sampling method does **not** satisfy the requirements set forth in Treas. Reg. § 1.472-8(e)(1) and, therefore, does **not** clearly reflect income.

Issue (2): *Whether [redacted]'s LIFO price index satisfies the requirements set forth in Treas. Reg. § 1.472-8(e)(2)(iv).*

[redacted] determines ratios for each sample unit. It then takes the summation of these ratios and divides by the number of sampling units. Section 1.472-8(e)(2)(iv) unequivocally requires the total current-year cost **of the pool** to be divided by the total base-year cost **of the pool** in determining the proper price index for the pool[5]

---

[3]This issue has been specifically identified in All Industries Coordinated Issue Paper entitled "Segment of Inventory Excluded from the Computation of the LIFO Index, effective date October 23, 1995 (Attachment B).

[4]Items under the dollar-value regulations are physical goods and not dollars. However, sampling dollars is not per se invalid, provided the dollar represents a real item in the taxpayer's inventory and is properly weighted.

[5]The Service has repeatedly recognized that the link-chain method utilizes the same methodology as the double-extension method except that inflation is measured in yearly intervals, referencing current-year and prior-year cost rather than current-year and base-year cost. The "annual link" is multiplied by the prior-year cumulative index to arrive at the current-year cumulative index for the

Thus, any other acceptable computation must invariably result in the same price index in order to be used in lieu of the "direct method" set forth under the regulations. Based on input from our expert in mathematics and statistics, only the use of a harmonic mean will satisfy this requirement [6]. Accordingly, [redacted]s method of determining its LIFO price index does **not** satisfy the requirements set forth in Treas. Reg. § 1.472-8(e)(2)(iv) and, therefore, does **not** clearly reflect income.

In accordance with CCDM (34)3(19)4, we are furnishing a copy of this advisory opinion applying well settled principles of law to the Assistant Chief Counsel (Field Service) for 10 day post issuance review.

If you have any questions regarding this matter, please contact the undersigned attorney at (313) 226-2023.

GRANT E. GABRIEL
Attorney

Attachment A: [redacted] SAMPLE METHODOLOGY

pool.

[6]See Memorandum, dated October 30, 1998 (previously provided) from Ronald J. Bartyczak, Mathematical Statistician, providing mathematical proof that only using the harmonic mean for portions of the pool will produce the same index as if the total current-year cost of the pool is divided by the total base-year cost of the pool in accordance with the requirements set forth in Treas. Reg. § 1.472-8(e)(2)(iv),